

CLAIMS

What is claimed is:

1. A folded interposer comprising:
a thin, flexible material comprised of a first surface and a second surface, said material for folding around at least one semiconductor die having substantially the same width as said at least one semiconductor die;
a plurality of vias extending from said first surface to said second surface; and
a plurality of electrical contacts on said first surface of said material.
2. The interposer of claim 1, wherein said material comprises an insulative polymer.
3. The interposer of claim 2, wherein said material further comprises a thermally conductive material.
4. The interposer of claim 1, wherein said second surface surrounds at least three sides of one semiconductor die around which said interposer is folded.
5. The interposer of claim 1, wherein said second surface surrounds at least two sides of said at least one semiconductor die around when said interposer is folded.
6. The interposer of claim 1, wherein said electrical contacts are applied to said second surface of said interposer.

7. A high density semiconductor package having at least two semiconductor die comprising:
a substrate having at least one contact pad on a surface thereof;
a flexible interposer folded around a first semiconductor die of said at least two semiconductor die, said interposer including a first surface having a plurality of electrical contacts for electrically connecting the first semiconductor die to a substrate, a second surface, and a plurality of vias extending through said interposer from said first surface to said second surface, the first semiconductor die having a plurality of bond pads on a surface thereof and a back surface, the first semiconductor die positioned in a back-to-back configuration with another semiconductor die of said at least two semiconductor die and attached to said interposer to form an intermediate packaging structure; at least one contact of said plurality of contacts of said flexible interposer connected to the at least one contact pad of said substrate.

8. The package of claim 7, wherein said vias are filled with conductive metal.

9. The package of claim 7, wherein said second surface surrounds at least three sides of the first semiconductor die around which said interposer is folded.

10. The interposer of claim 7, wherein said second surface surrounds at least two sides of the first semiconductor die around which said interposer is folded.

11. The package of claim 7, wherein at least one bond pad of said bond pads of said first semiconductor die is in electrical communication with at least one electrical contact of said electrical contacts of said flexible interposer through said vias therein.

12. The package of claim 7, wherein said interposer folds around more than two semiconductor die by weaving in a serpentine fashion around groups of semiconductor die including two semiconductor die.

13. The package of claim 7, wherein said substrate comprises a semiconductor device.

14. The package of claim 7, wherein said substrate further comprises a printed circuit board.

15. The package of claim 7, further comprising electrical contacts applied to a top surface of said package.

16. A method of packaging at least one semiconductor die in a high density arrangement comprising:
providing a substrate;
providing a flexible interposer including a first surface having a plurality of electrical contacts for electrically connecting at least one semiconductor die to a substrate, a second surface, and a plurality of vias extending through said flexible interposer from said first surface to said second surface;
providing at least one semiconductor die having a plurality of bond pads on a first surface thereof;
attaching said at least one semiconductor die to said flexible interposer forming an intermediate structure, said interposer being folded around said at least one semiconductor die, said at least one die being in electrical communication with said substrate through said flexible interposer; and
attaching said intermediate structure to said substrate.

17. The method of claim 16, wherein said vias are filled with conductive metal.

18. The method of claim 16, wherein said second surface surrounds at least three sides of the at least one semiconductor die around which said interposer is folded.

19. The interposer of claim 16, wherein said second surface of said interposer surrounds at least two sides of the at least one semiconductor die around which said interposer is folded.

20. The method of claim 16, wherein said bond pads are in electrical communication with said electrical contacts through said vias in the flexible interposer.

21. The method of claim 16, wherein said interposer folds around more than two semiconductor die in a serpentine fashion around groups including at most two semiconductor die therein.

22. The method of claim 16, further comprising applying electrical contacts to a top surface of a high density semiconductor package to attach semiconductor devices to said package.

23. A method of forming a high density semiconductor package comprising:
providing at least one semiconductor die having a plurality of bond pads on a surface of said at least one die;
providing an interposer including a first surface having a plurality of electrical contacts, a second surface, and a plurality of vias extending through said interposer from said first surface to said second surface;
attaching said at least one die to said interposer to form an intermediate packaging structure;
providing a substrate;
attaching said substrate to said intermediate structure; and
connecting between said substrate and said at least one semiconductor die.

24. The method of claim 23, wherein said attaching said at least one die further comprises:
attaching multiple semiconductor die in groups of two semiconductor die, said semiconductor die having a in a back-to-back configuration, the back side of one semiconductor die substantially contacting the back side of another semiconductor die of a group.

25. The method of claim 23, wherein said electrical contacts and said bond pads provide electrical communication through said vias of the flexible interposer.

26. The method of claim 23, further comprising:
forming electrical contacts on a top surface of said package to attach semiconductor device components.

27. A computer system comprising:
an input device;
an output device;
a processor, coupled to said input device and said output device; and
a memory module, coupled to said processor, comprising:
a module board having at least one electrical circuit in electrical
communication with at least one high density semiconductor package; and
said high density semiconductor package attached to and in electrical
communication with said module board, said package comprising:
a flexible interposer folded around at least one semiconductor die,
said interposer including a first surface having a plurality of electrical
contacts for electrically connecting said at least one semiconductor die to
a substrate, a second surface, and a plurality of vias extending through
said interposer from said first surface to said second surface, said at least
one semiconductor die having a plurality of bond pads on a surface thereof
and a back side surface, said at least one semiconductor die attached to
said interposer to form an intermediate packaging structure; and
said substrate attached to said intermediate packaging structure,
said substrate connected to said die through said electrical contacts and
bond pads.

28. The computer system of claim 27, wherein said substrate comprises a printed circuit board.

29. The computer system of claim 27, wherein said system further comprises a cellular telephone.

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